

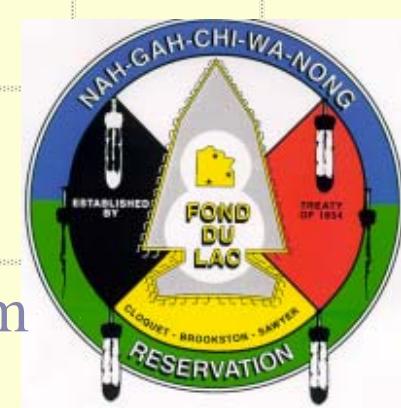
# Mercury Fate & Transport on the Fond du Lac Reservation

Monitoring Air, Water, Sediments and Biota

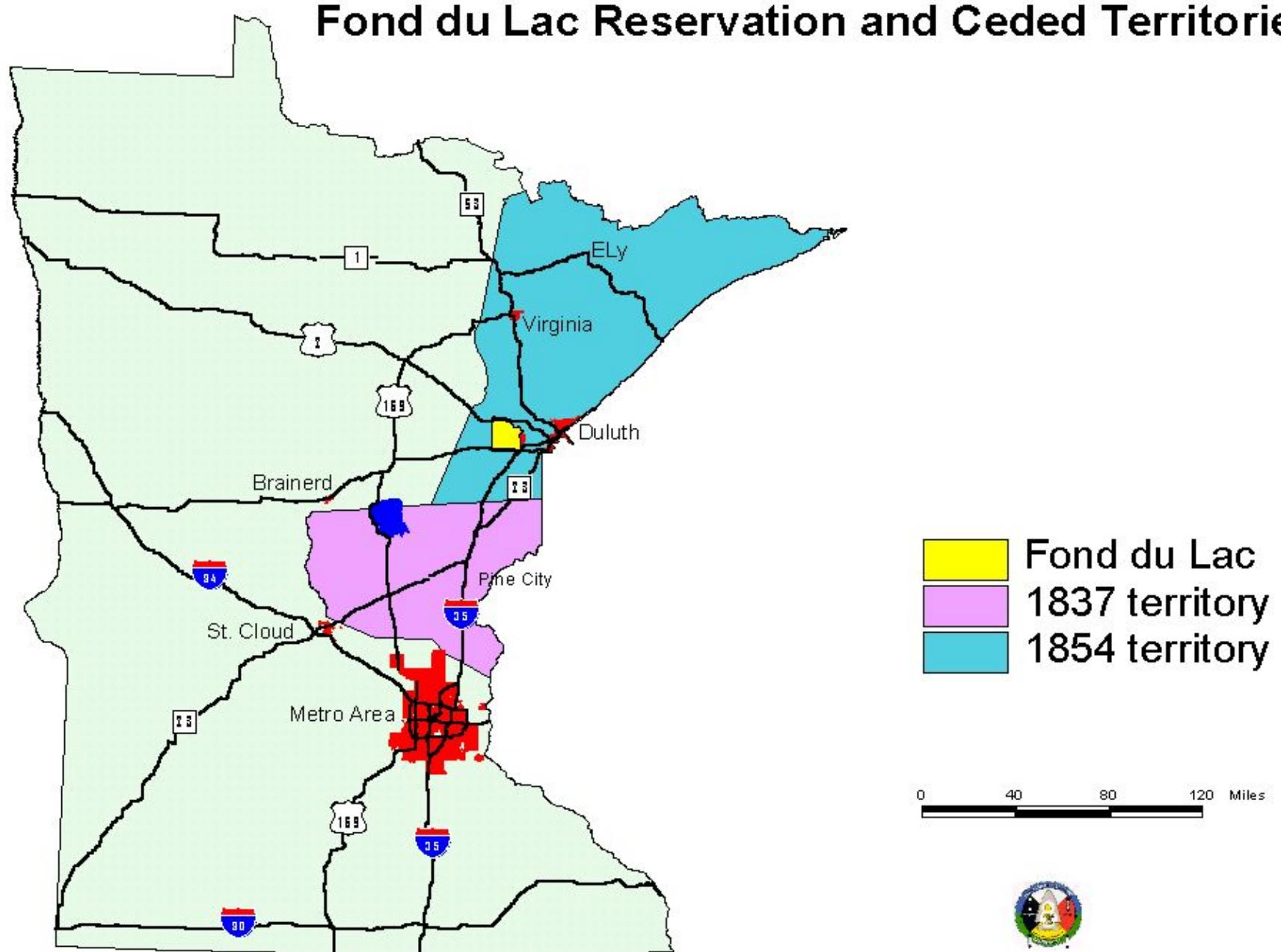
Nancy Costa, Fond du Lac Water  
Projects Coordinator

John Sorensen, Univ. of MN Duluth

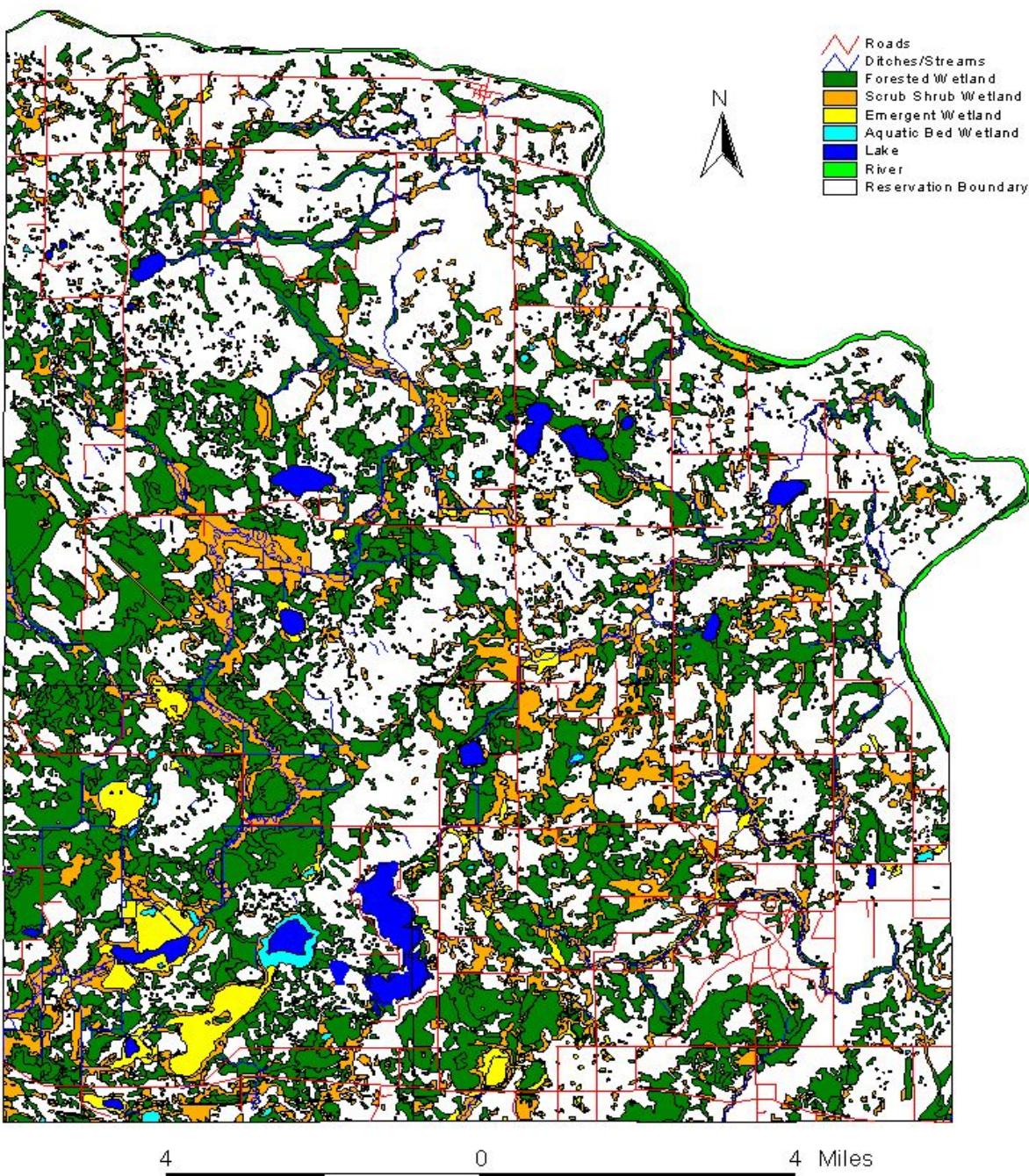
Presentation to EPA National Science Forum  
Washington, DC

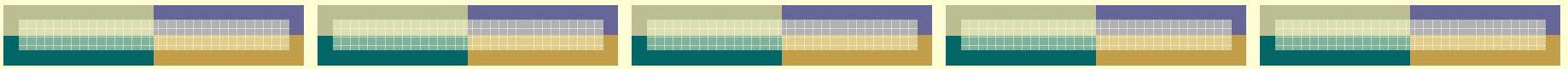


# Fond du Lac Reservation and Ceded Territories



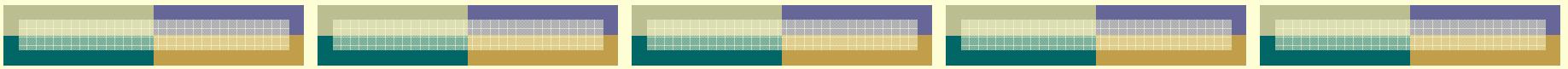
## Map 5 - Fond du Lac Wetland Types





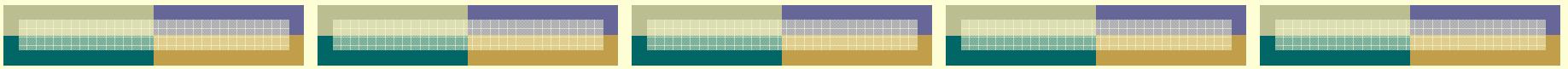
# Tribal Mercury Concerns

- Boreal forest/wetland ecoregion is especially sensitive to mercury deposition
  - Ionic and elemental forms more likely to be methylated
  - Greater bioavailability to aquatic food web
  - Bioaccumulation in higher trophic levels: piscivorous fish, eagles, osprey, loons, kingfishers, mink, otters....and people
- 



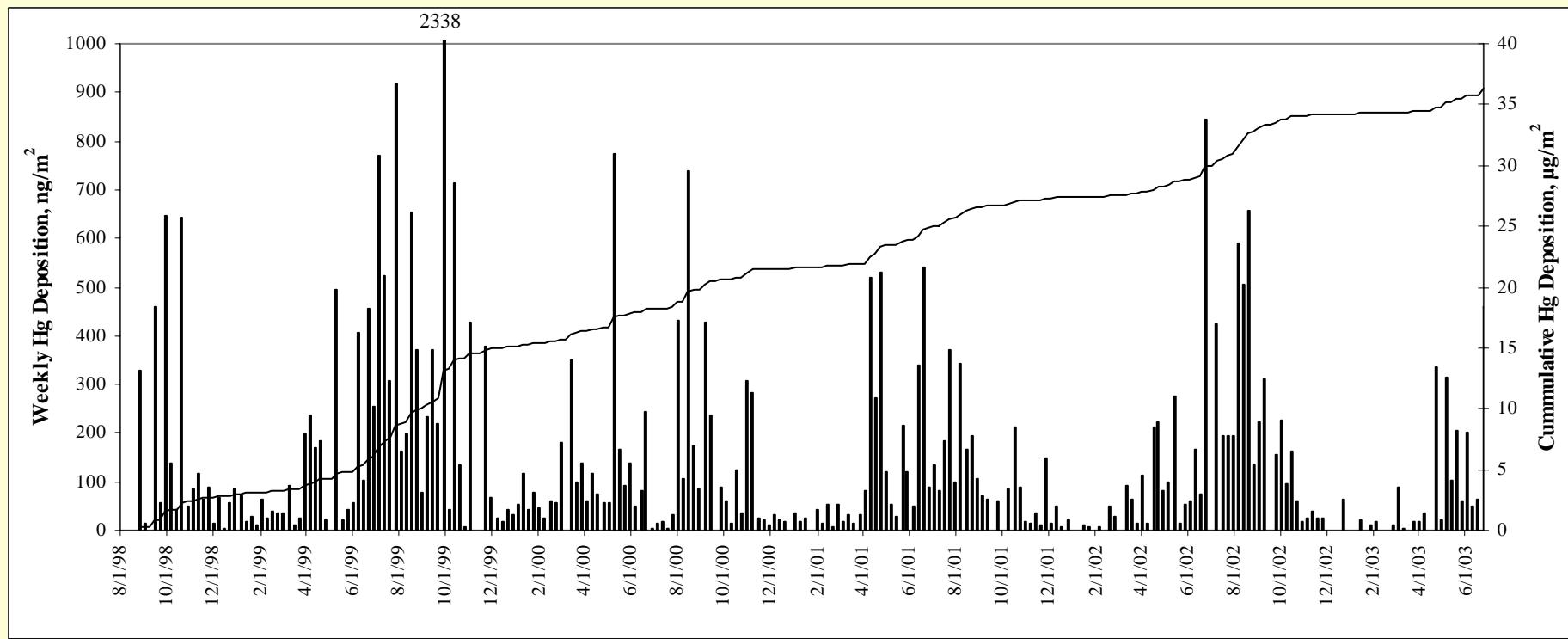
# Natural and Cultural Resources

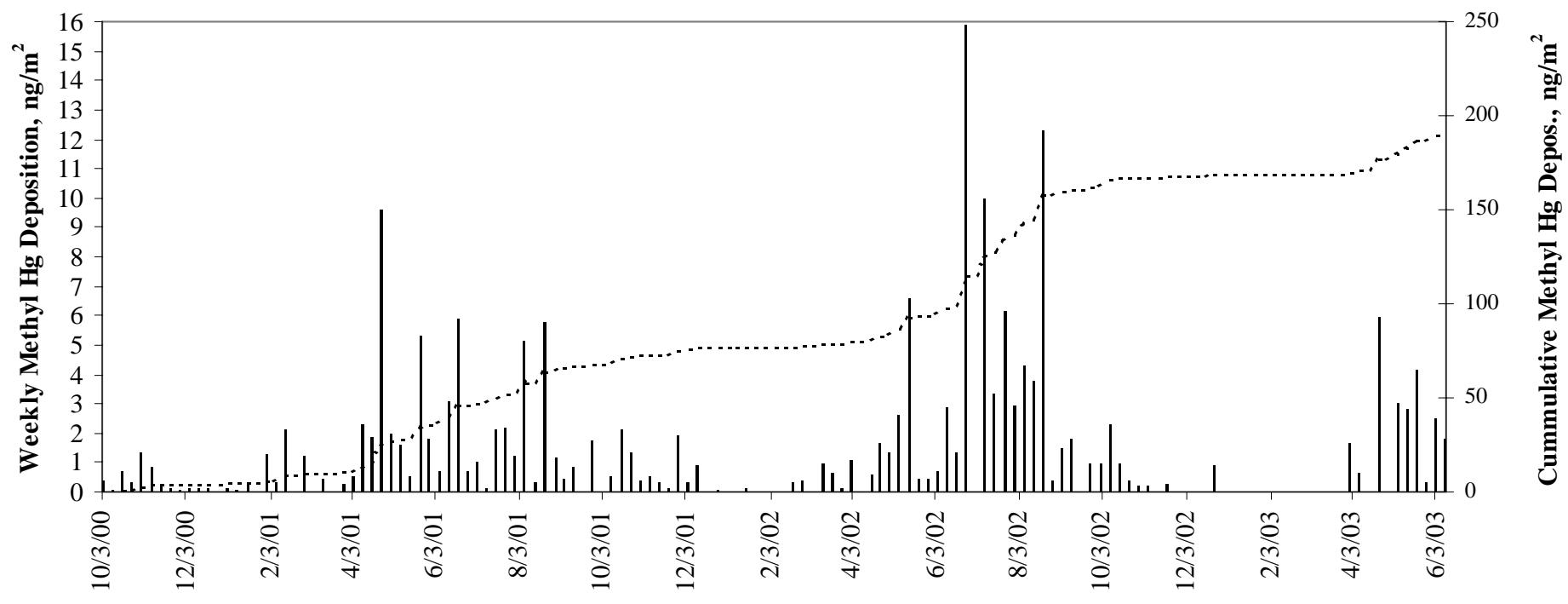
- Tribal community relies upon natural resources for subsistence: wild rice, fish, waterfowl, game
  - Health concerns from exposure to environmental contaminants
  - Resource monitoring and protection efforts acknowledge mercury risks
- 

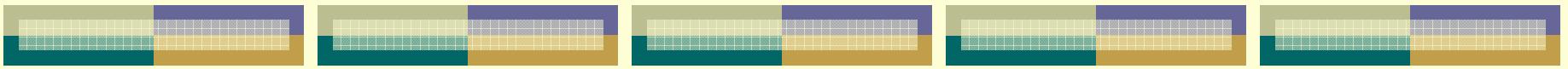


# Tribal Air Monitoring

- Participation in National Atmospheric Deposition Program since January 1997 (acid deposition, chemistries)
  - Total mercury in precip since 1998
  - Methyl mercury in precip since 2000
- 

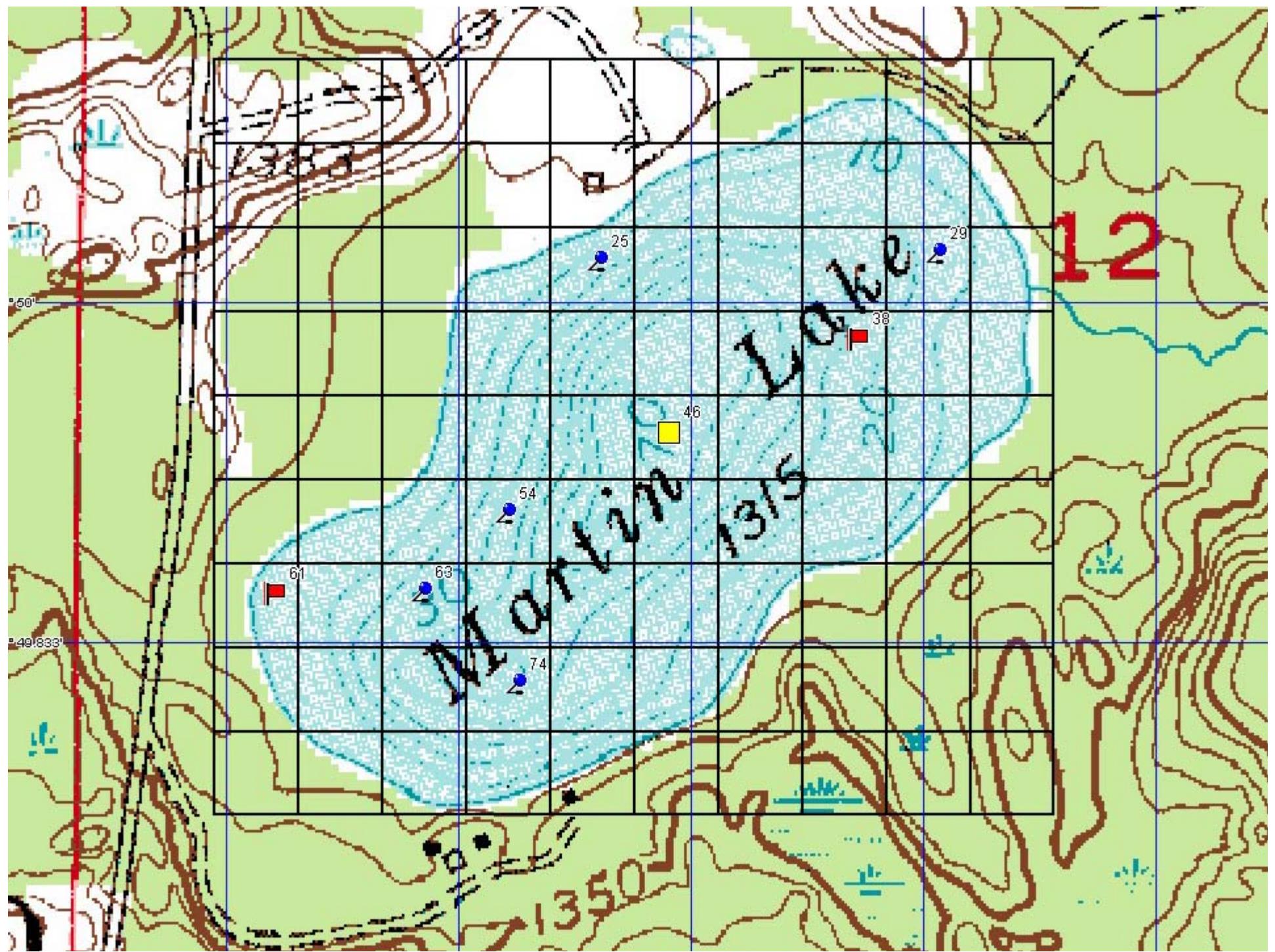




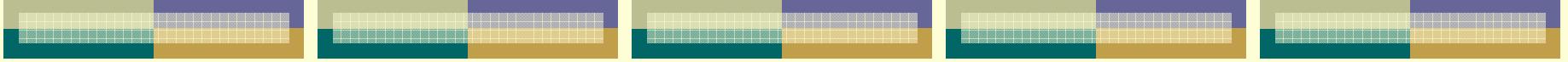


# Sediment Assessments

- GLNPO funded study of 12 reservation lakes: characterize sediments, assess contaminant levels in bioavailable portion (Hg, PCBs, Pb), toxicity tests
  - Sediment quality database developed; an additional indicator of reservation water quality; included in 305(b) report
  - Weight of evidence approach to decision-making about water resources
- 

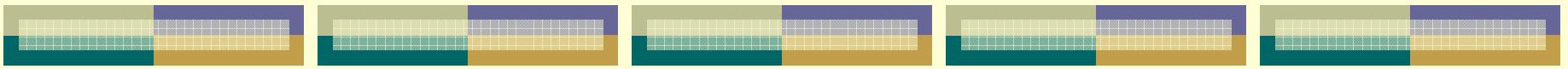






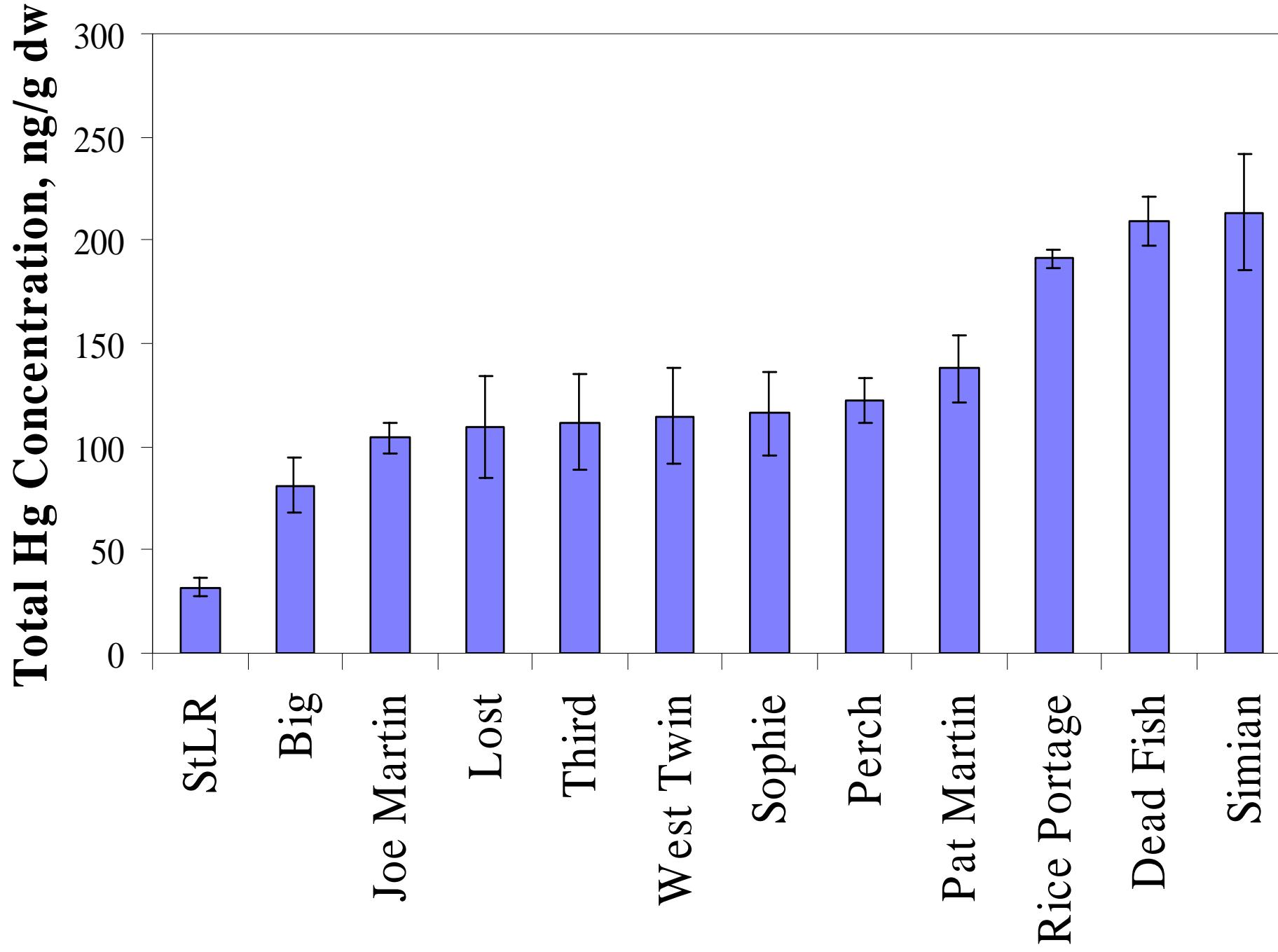
# Results

- As expected, higher Hg values associated with organic sediments
  - 30 of 96 sites had dry wt Hg exceeding Level I SQT of 0.18ug/g
  - Shallow wild rice lakes, shallow flowage lake (highly stained) had consistently higher Hg levels
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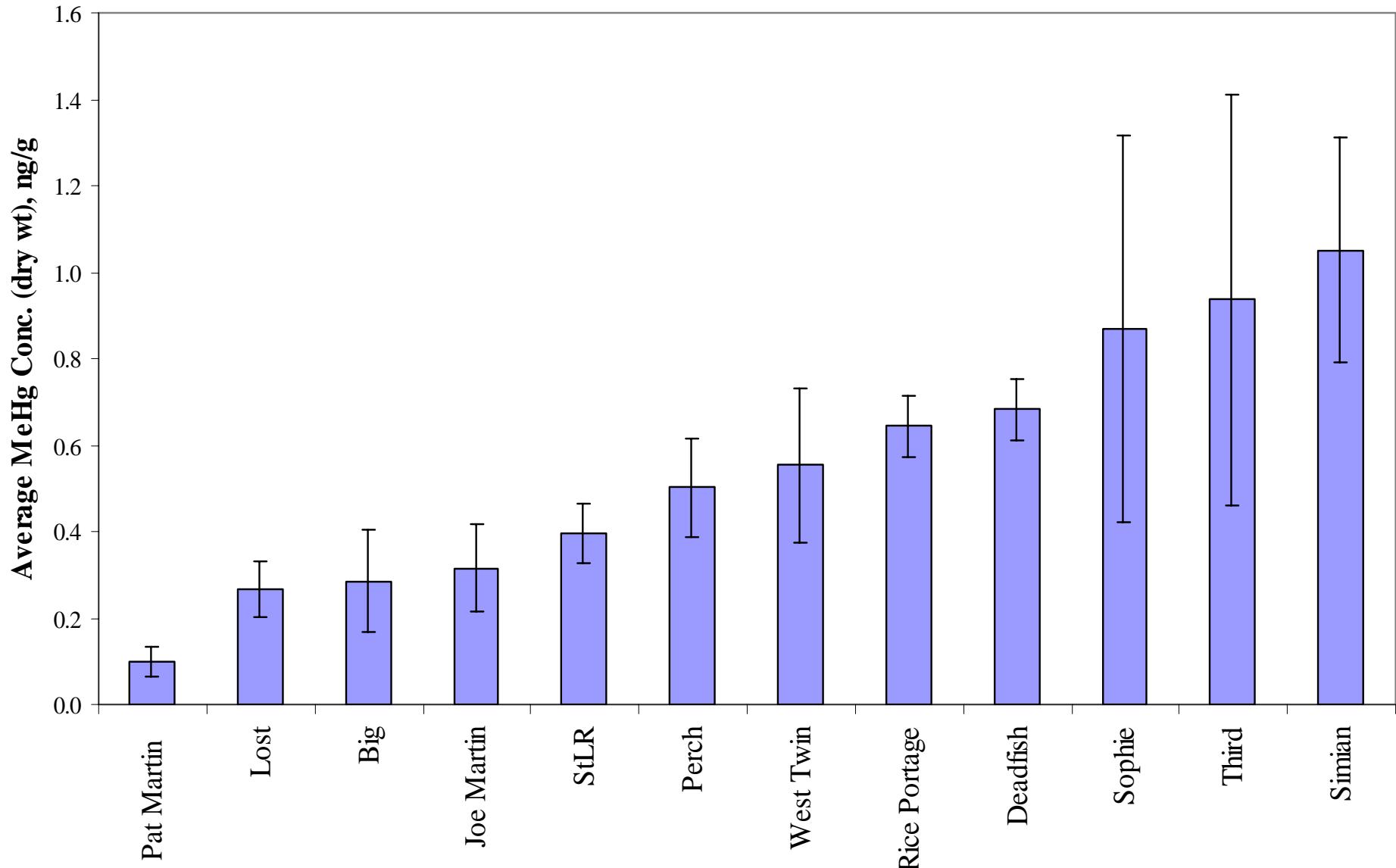


# Phase II Sediment Study

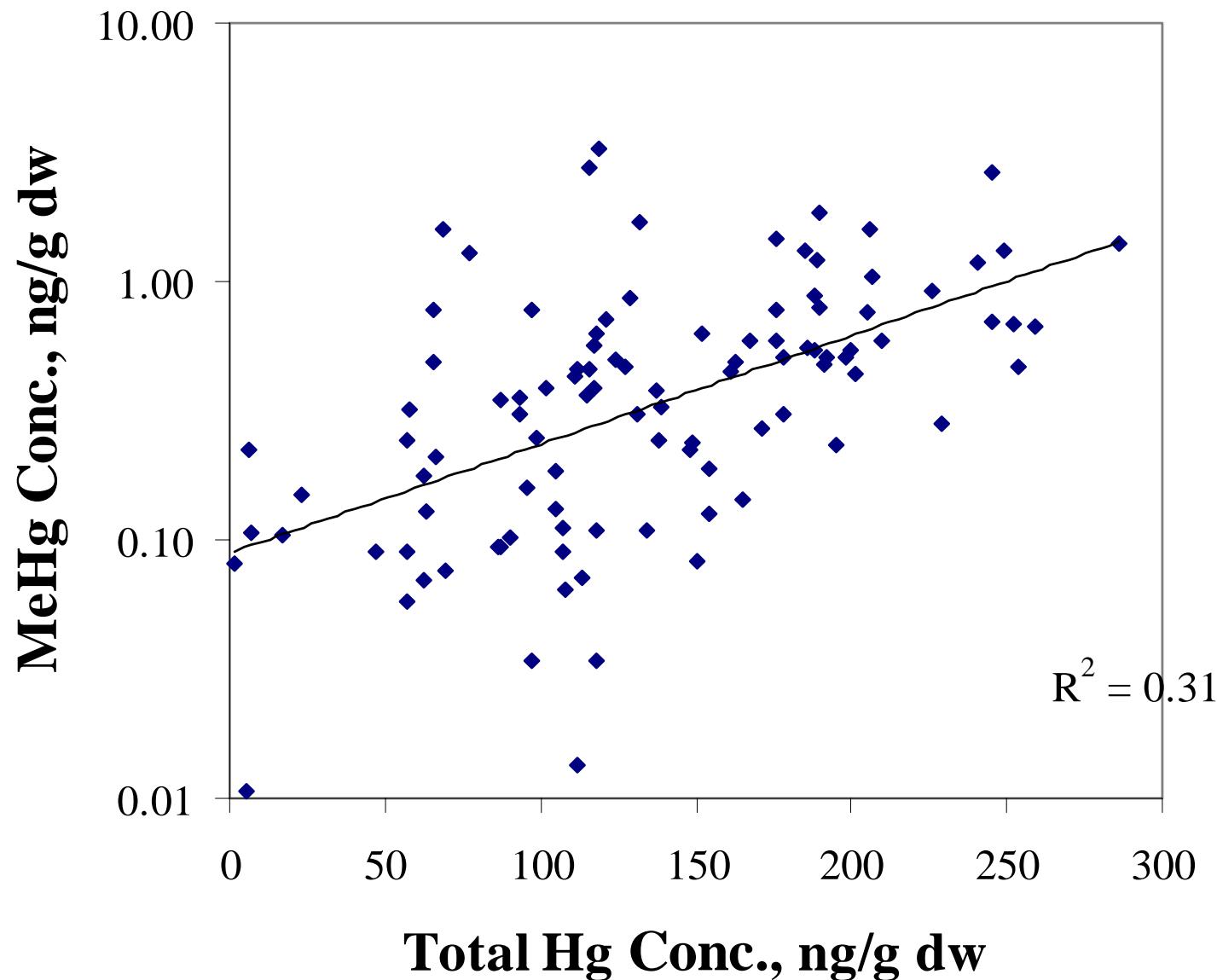
- Second GLNPO project included twelve St. Louis River sites; same parameters plus methyl mercury
  - Analyzed archived samples from first study for meHg
  - Added to database
- 



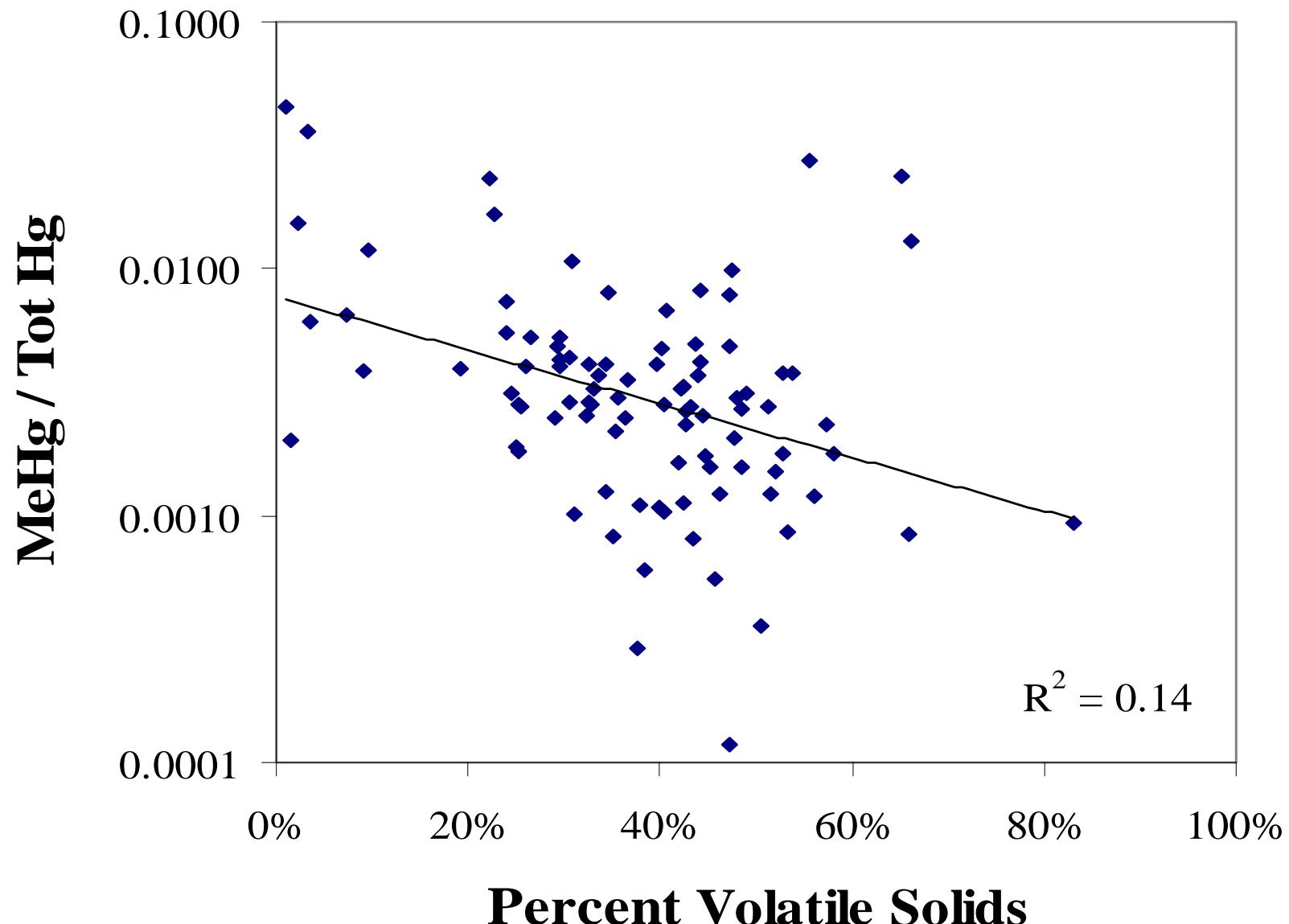
## Average Across Sites for Each Water Body



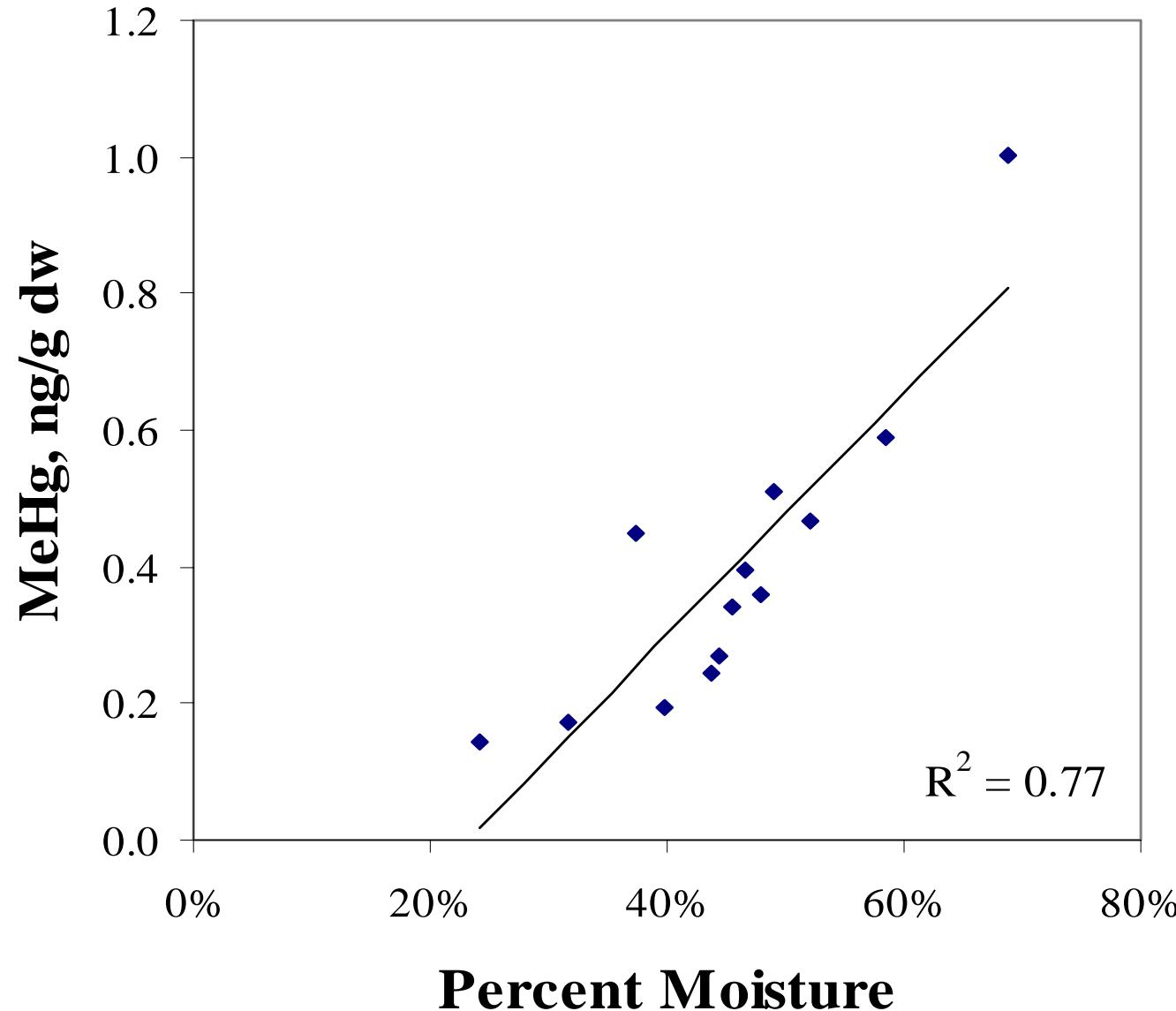
## All Lakes



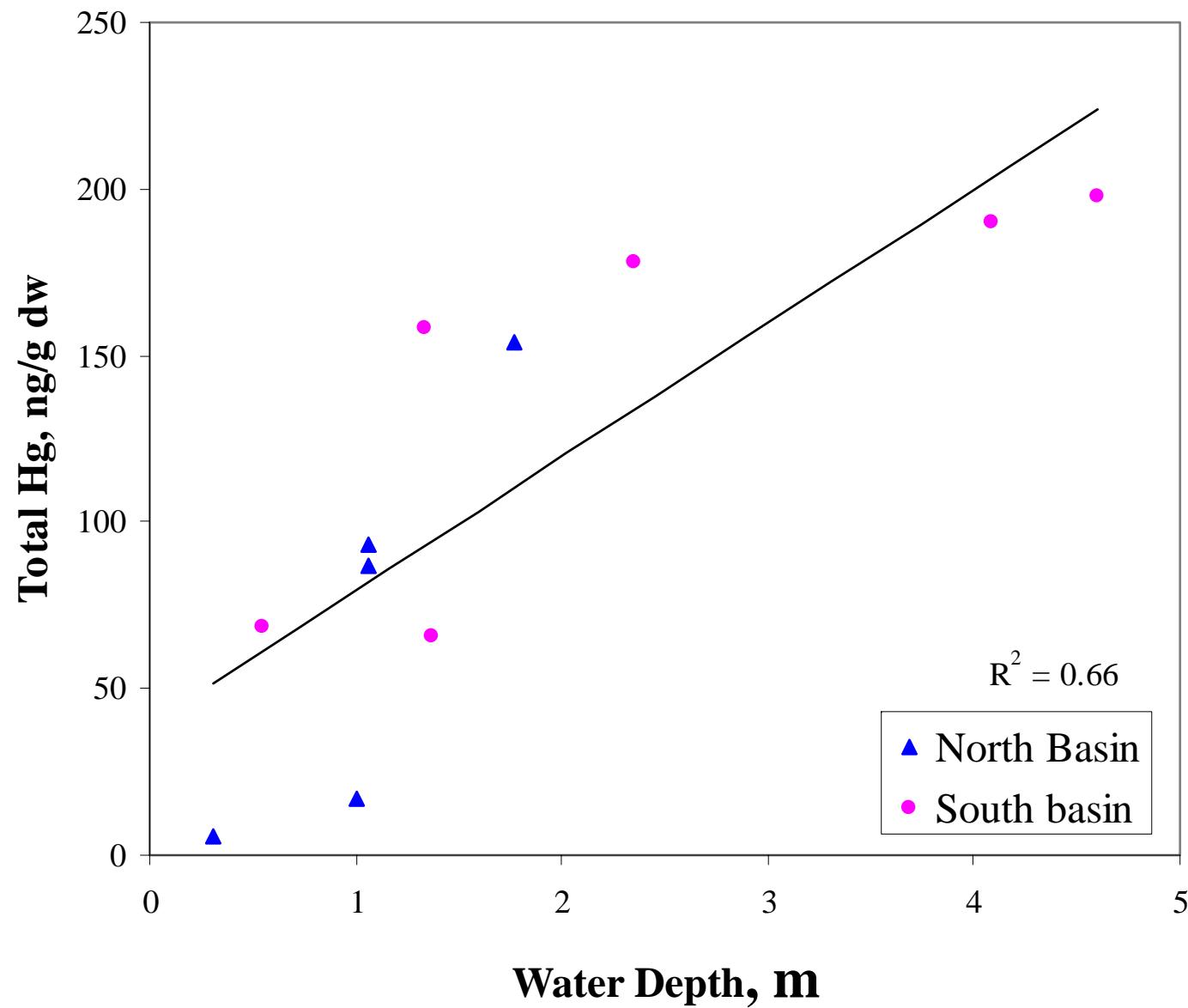
## All Lakes



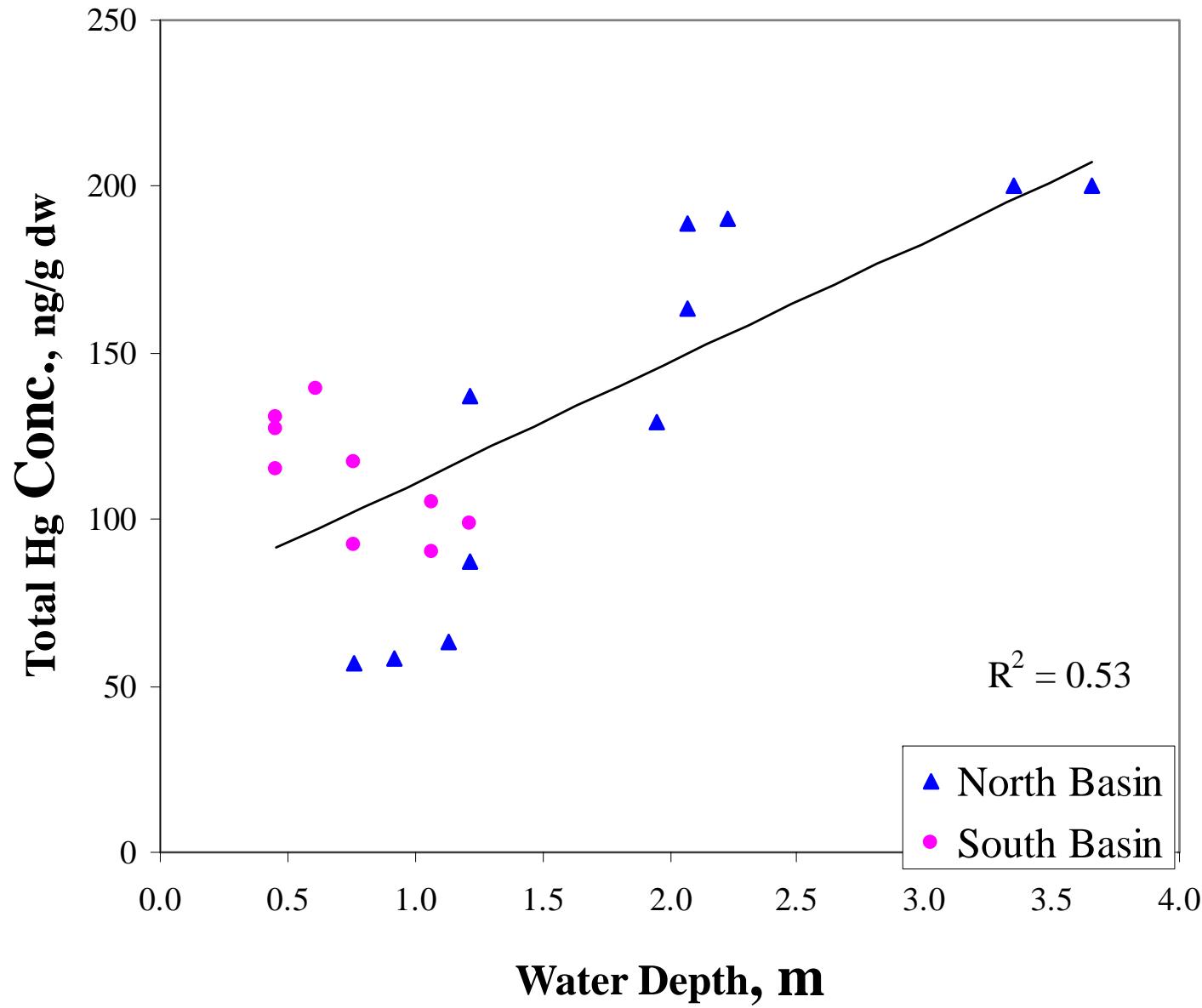
## St. Louis River



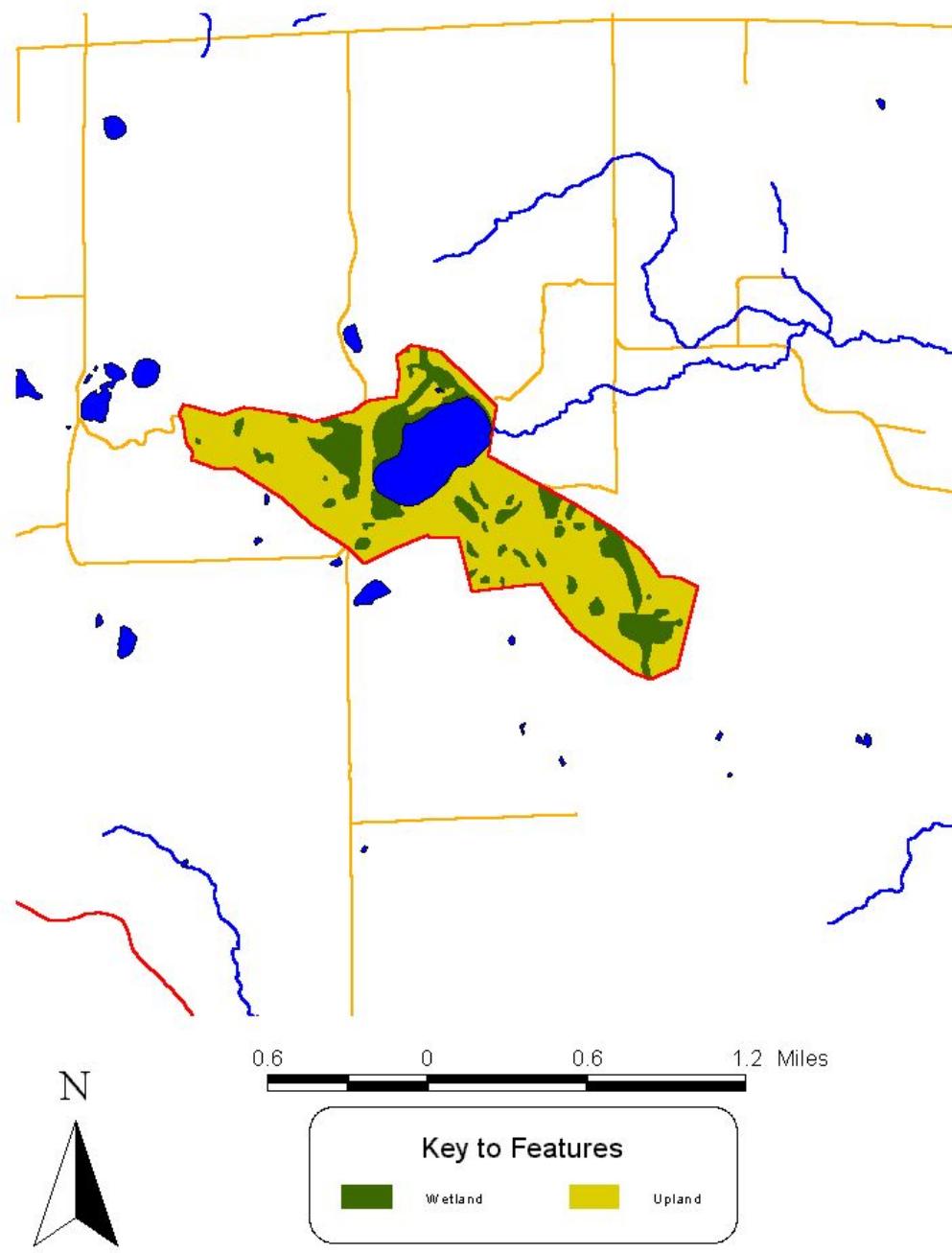
## West Twin

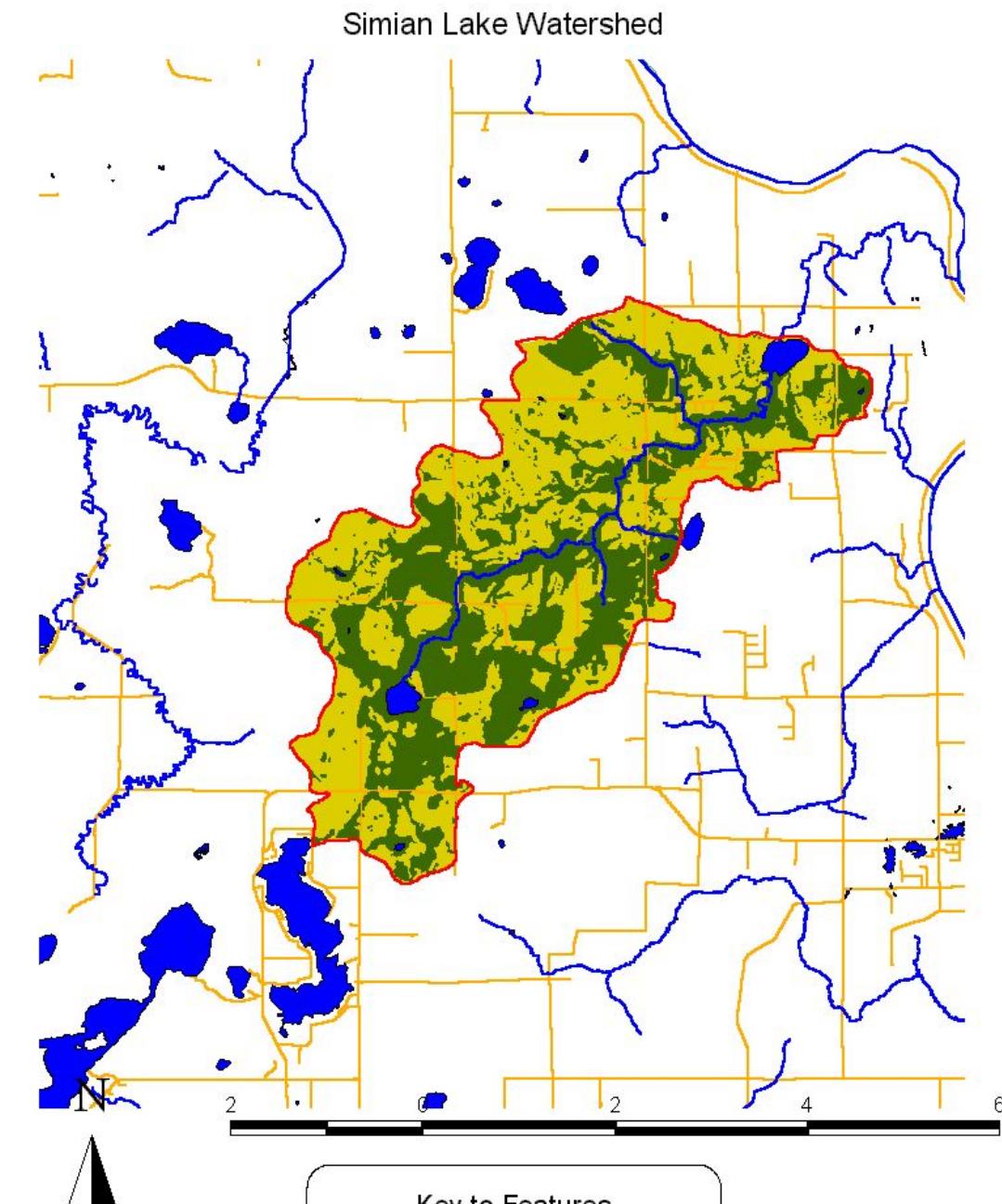


# Perch Lake

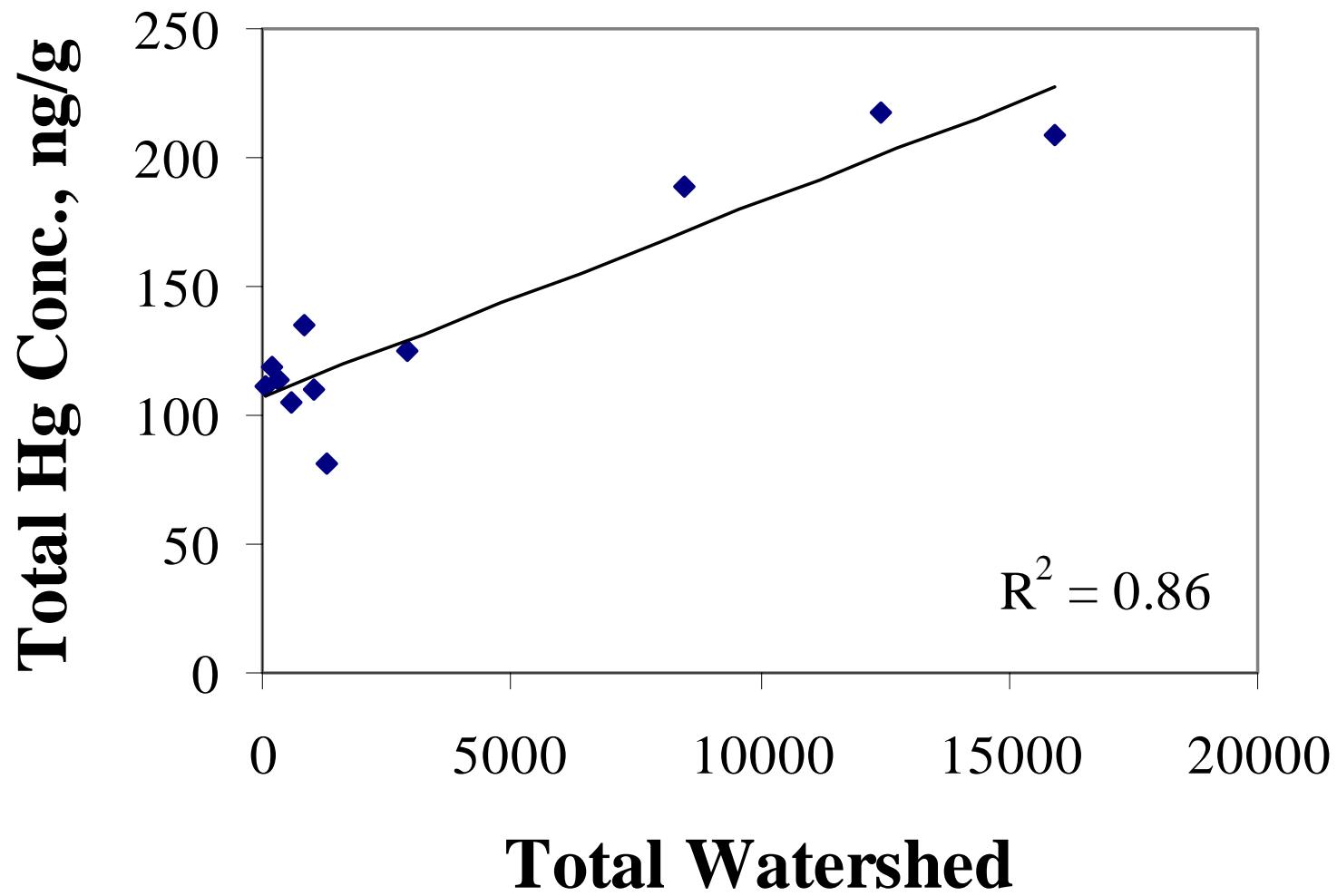


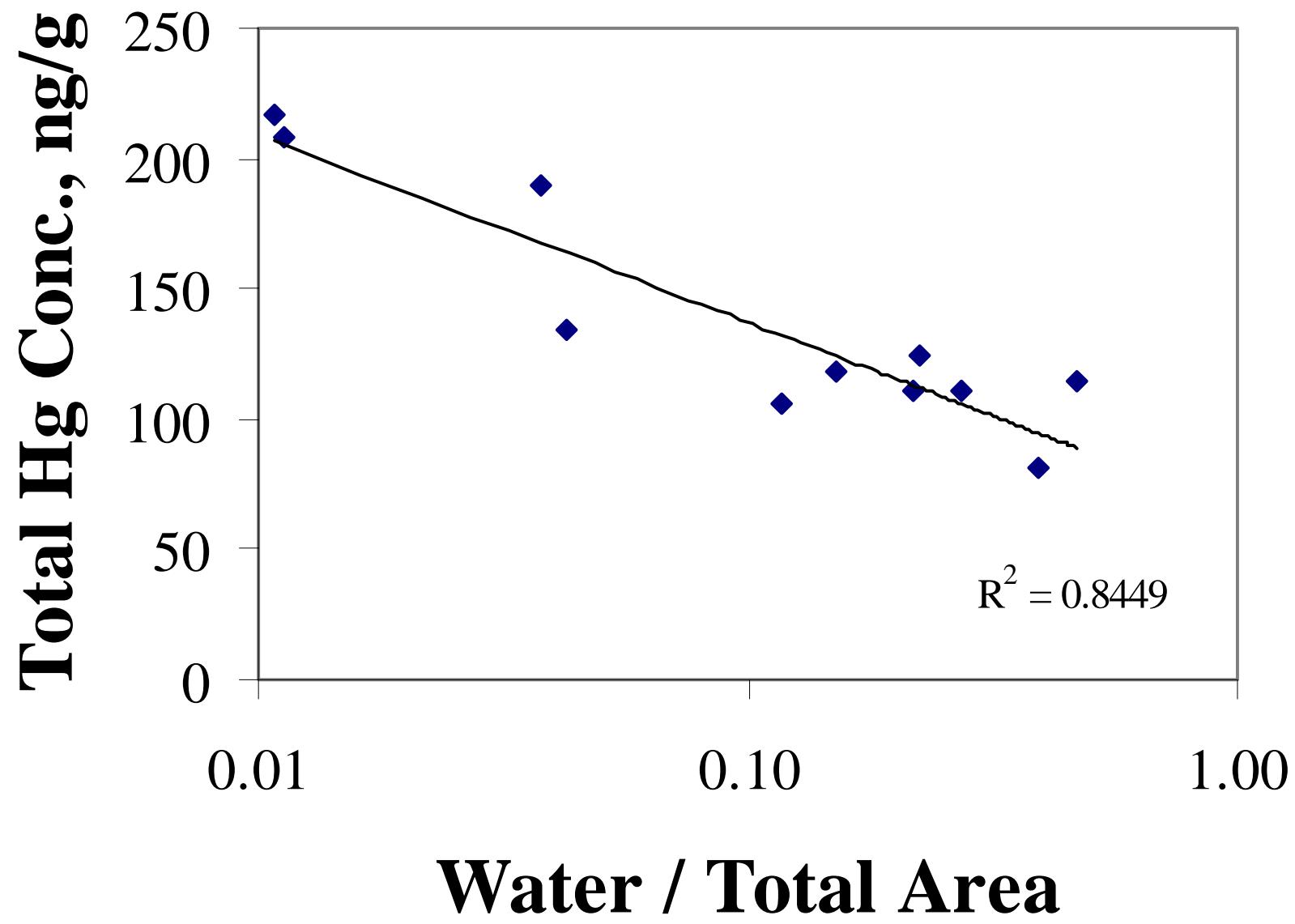
## Joe Martin Lake Watershed

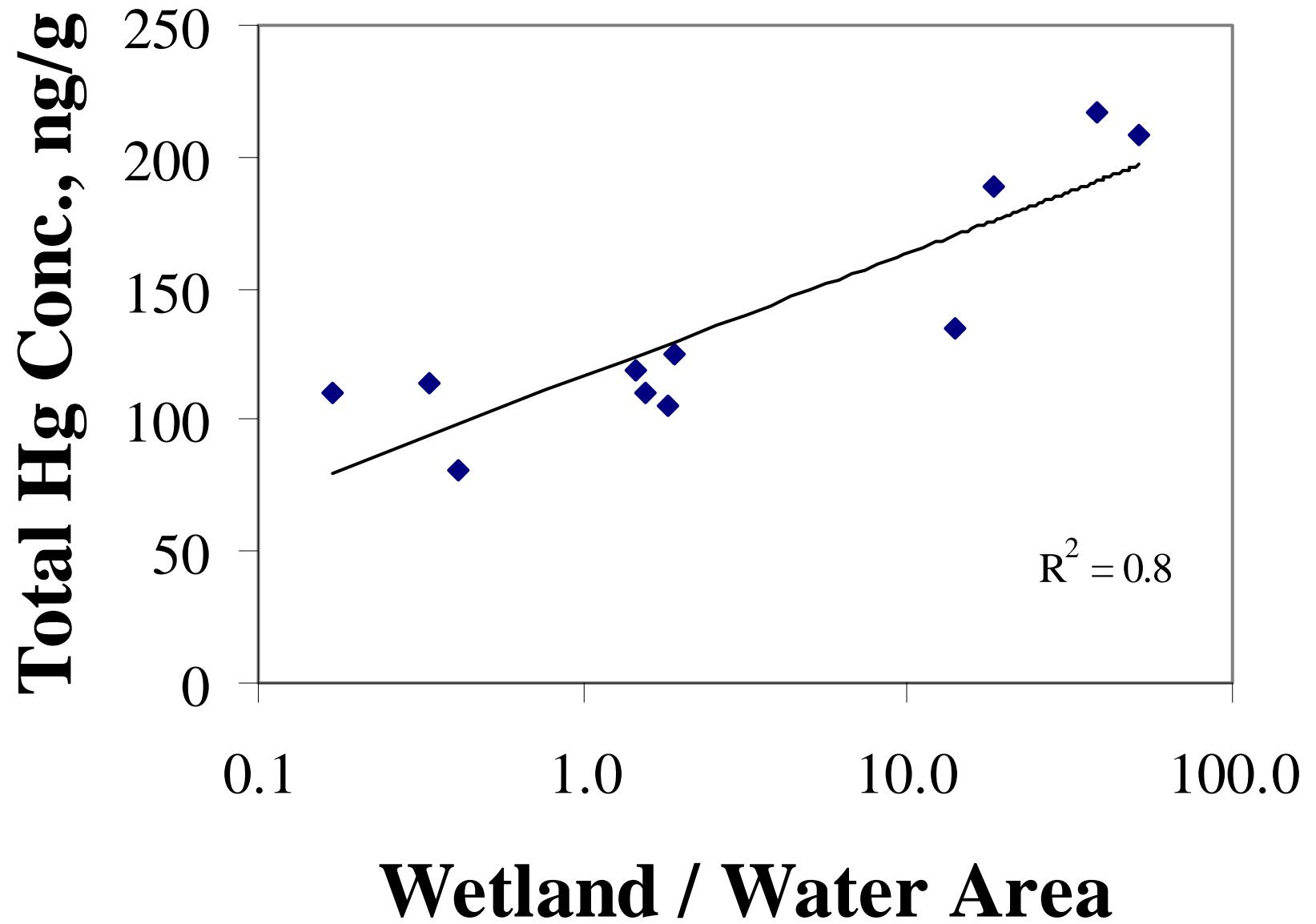




## Lake Averages







Sci Lab Services Inc. Dept. of Physics  
University of Texas at Austin, TX 78712

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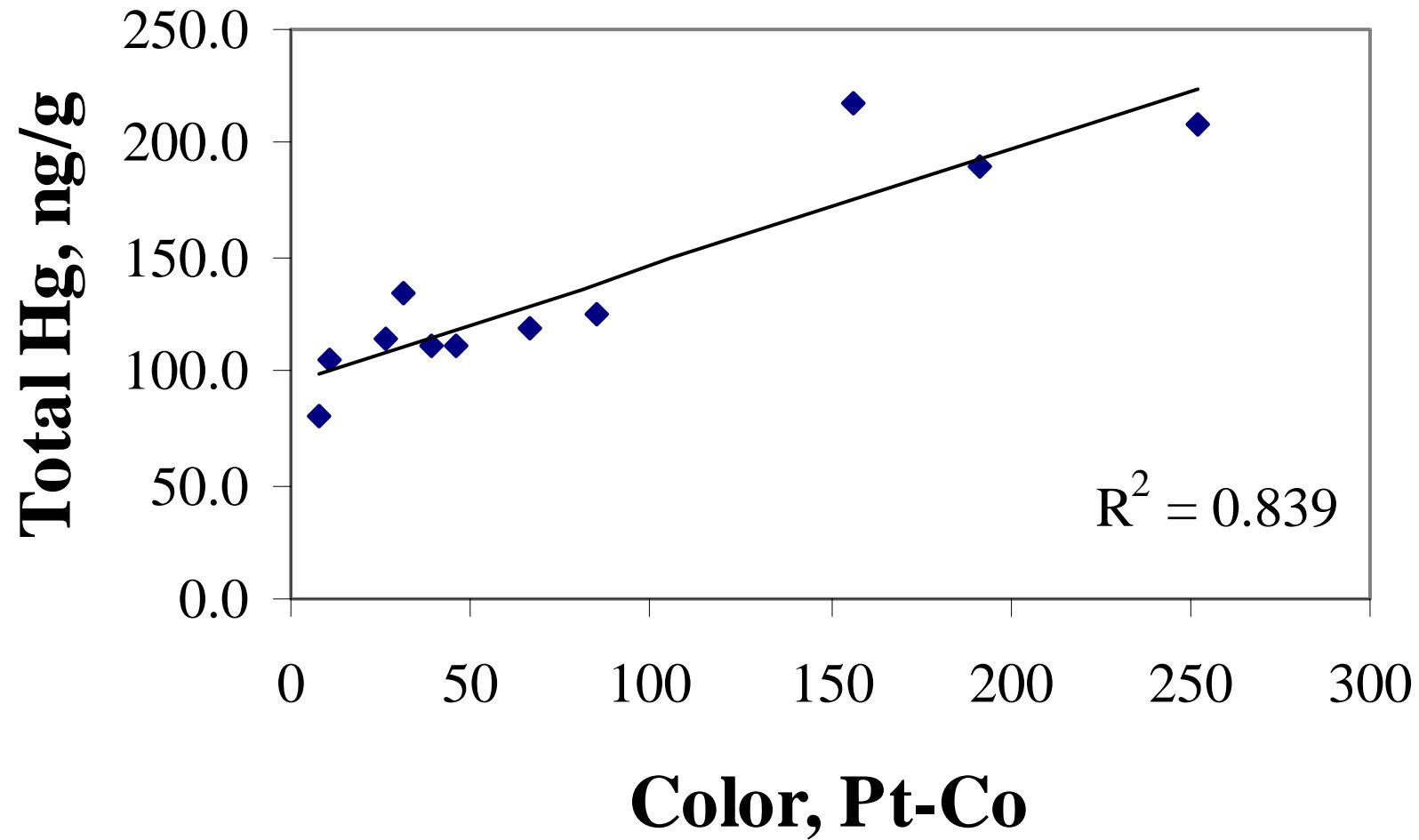
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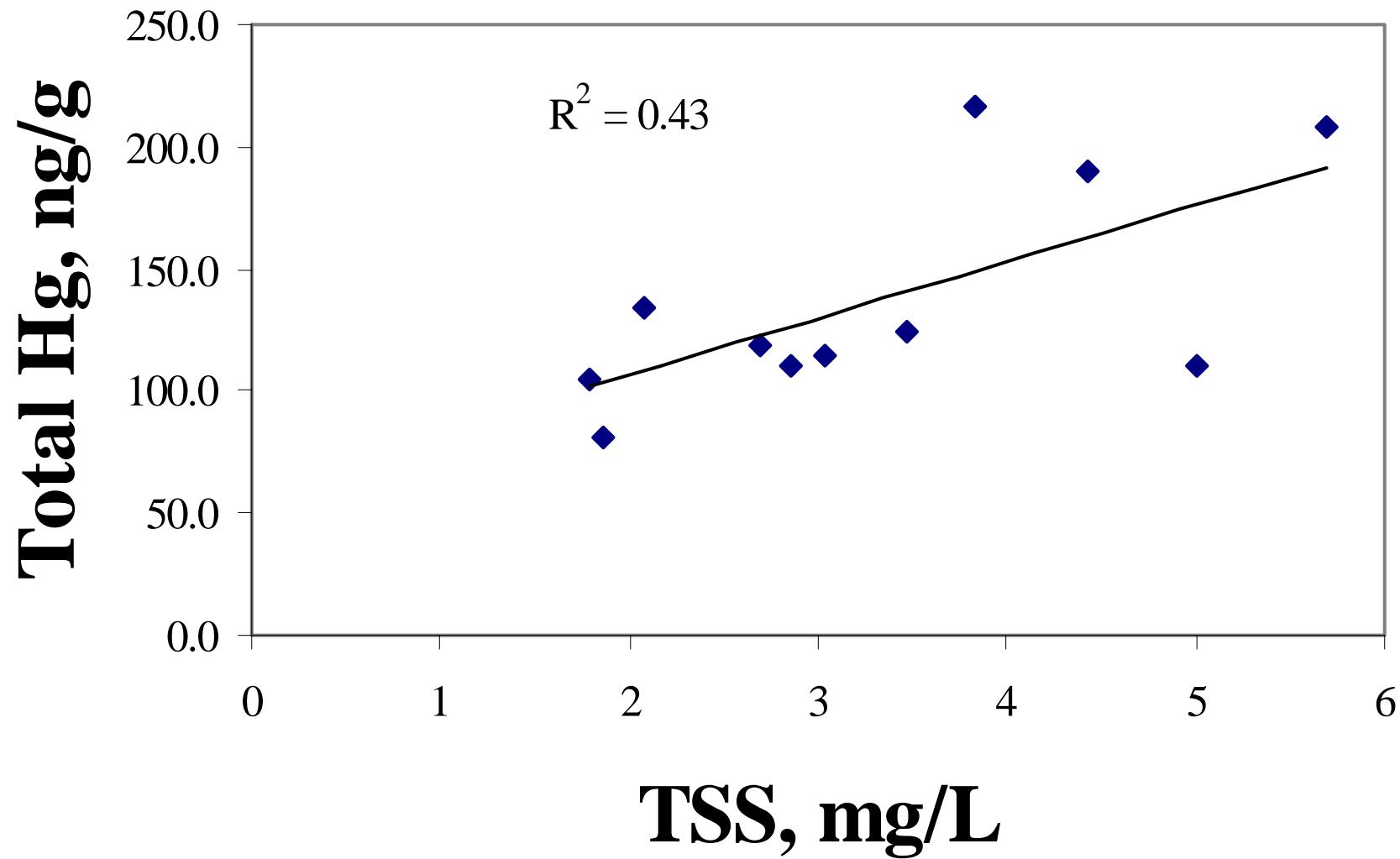
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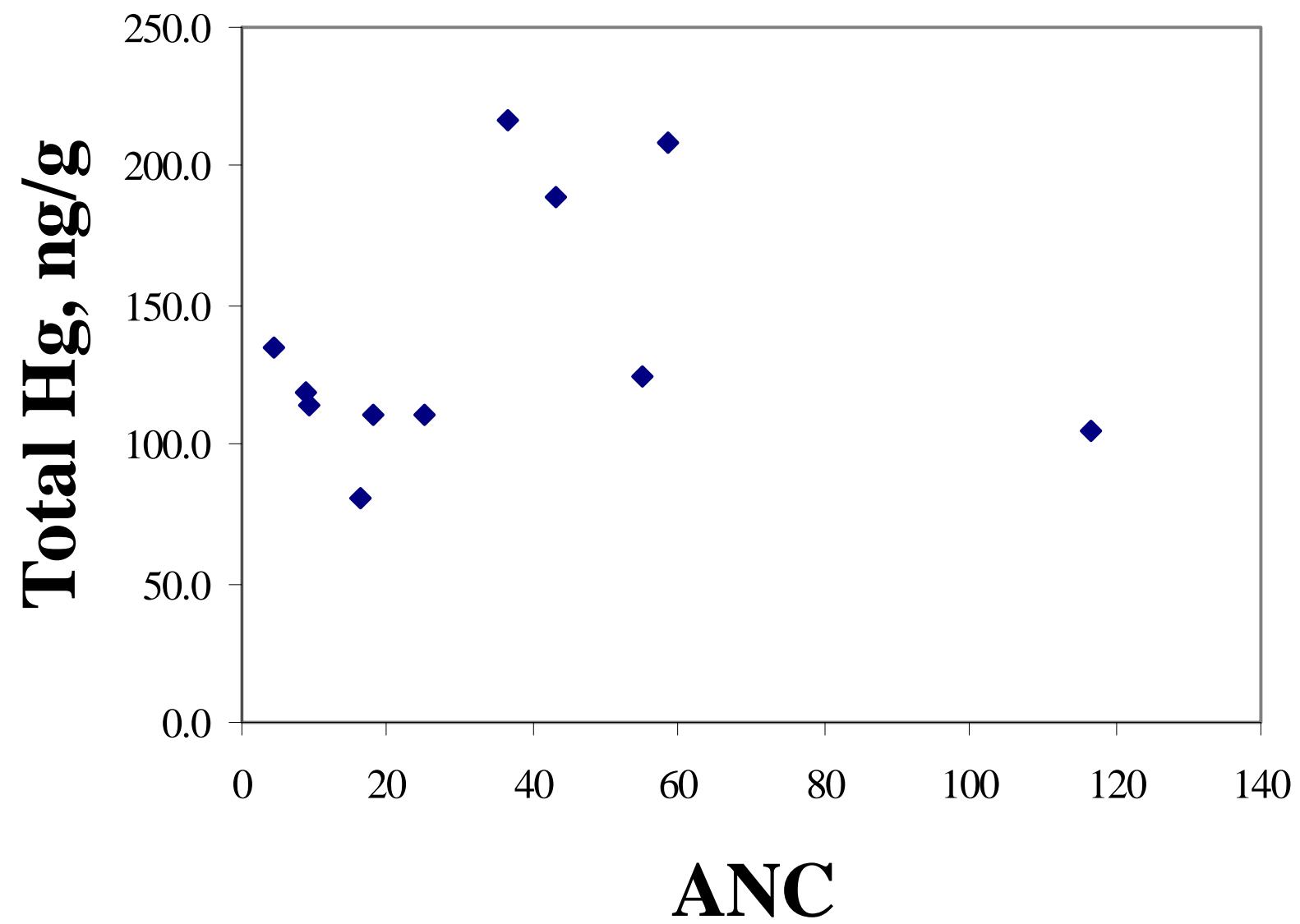
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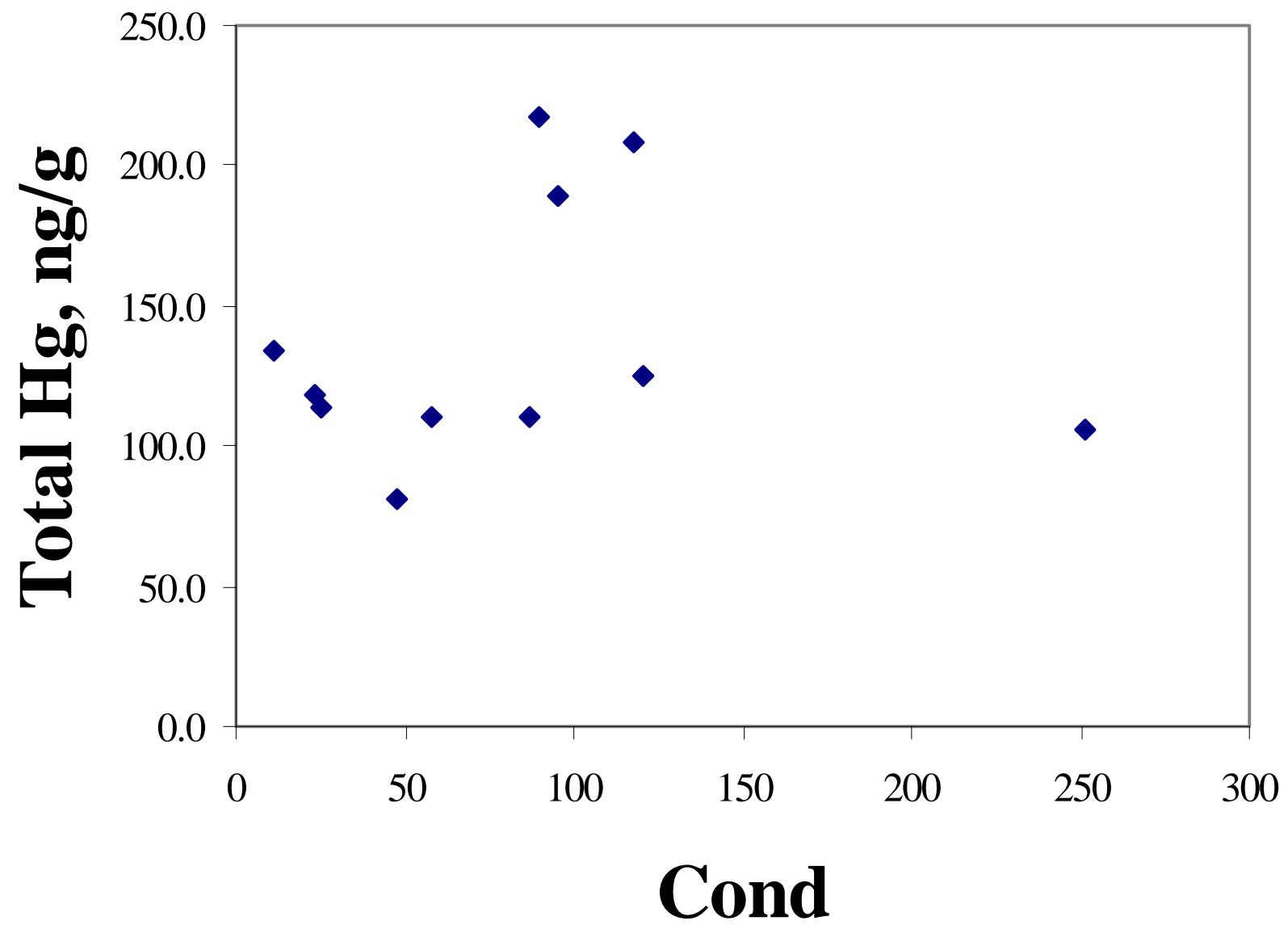
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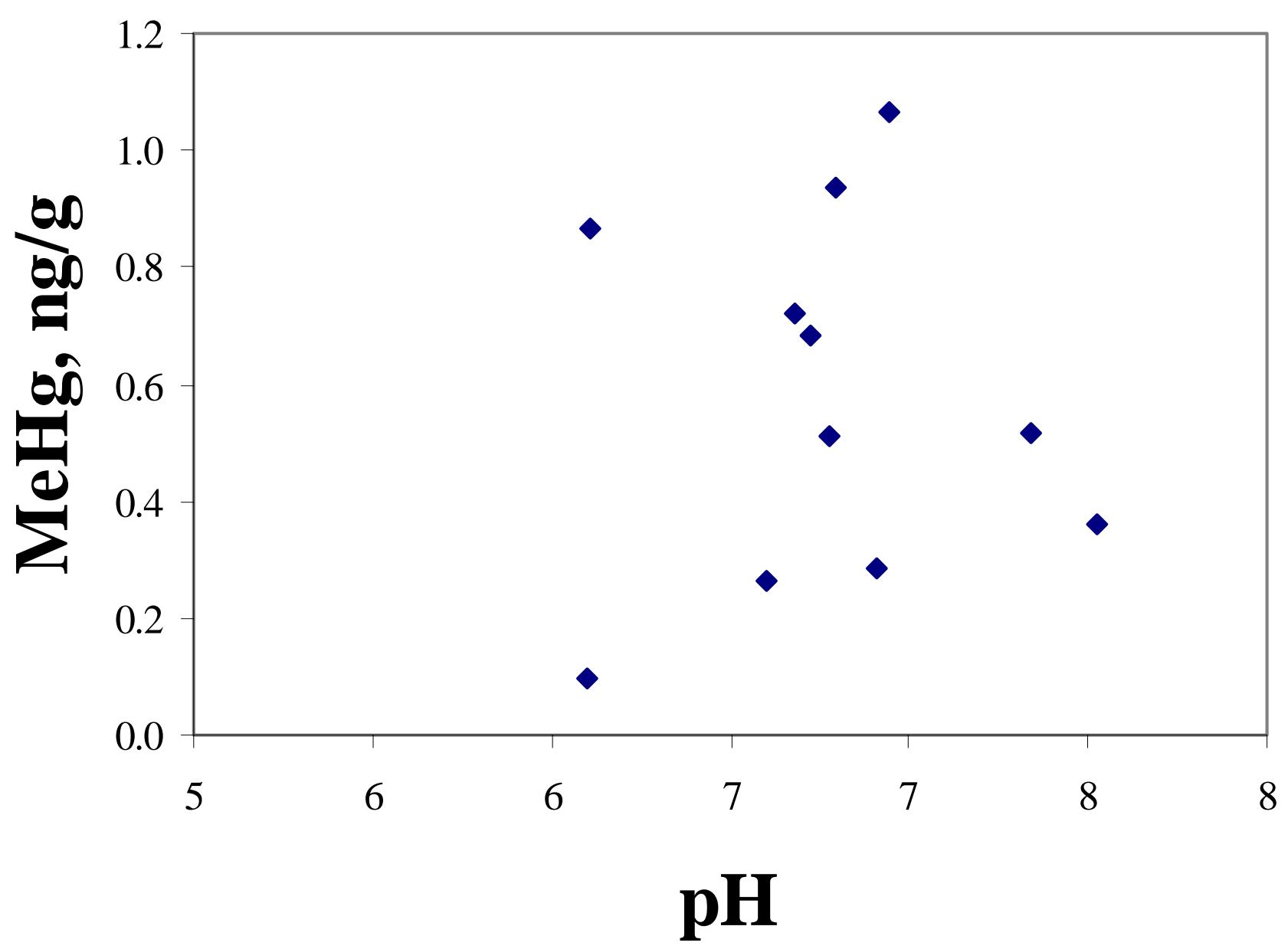


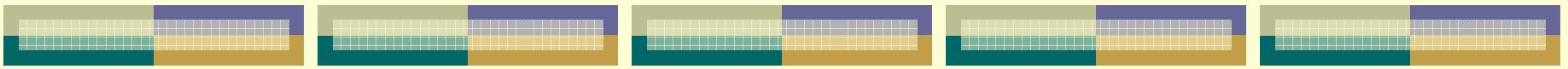
## Lake Averages





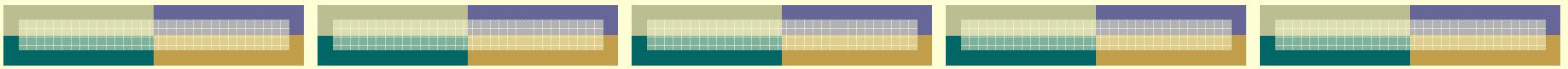






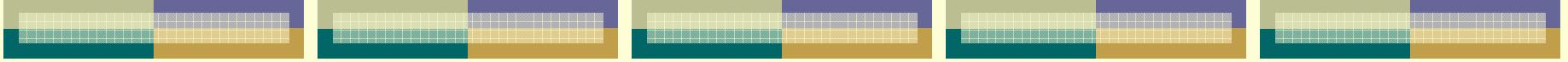
# Transfer to Biota

- Partnered with MN Dept. of Health to study fish contaminants; develop culturally sensitive consumption guide
  - Fish collected from reservation waters; targeted species that are commonly eaten
  - Mercury drives consumption restrictions (ruled out PCBs, organochlorine pesticides, toxaphene)
- 



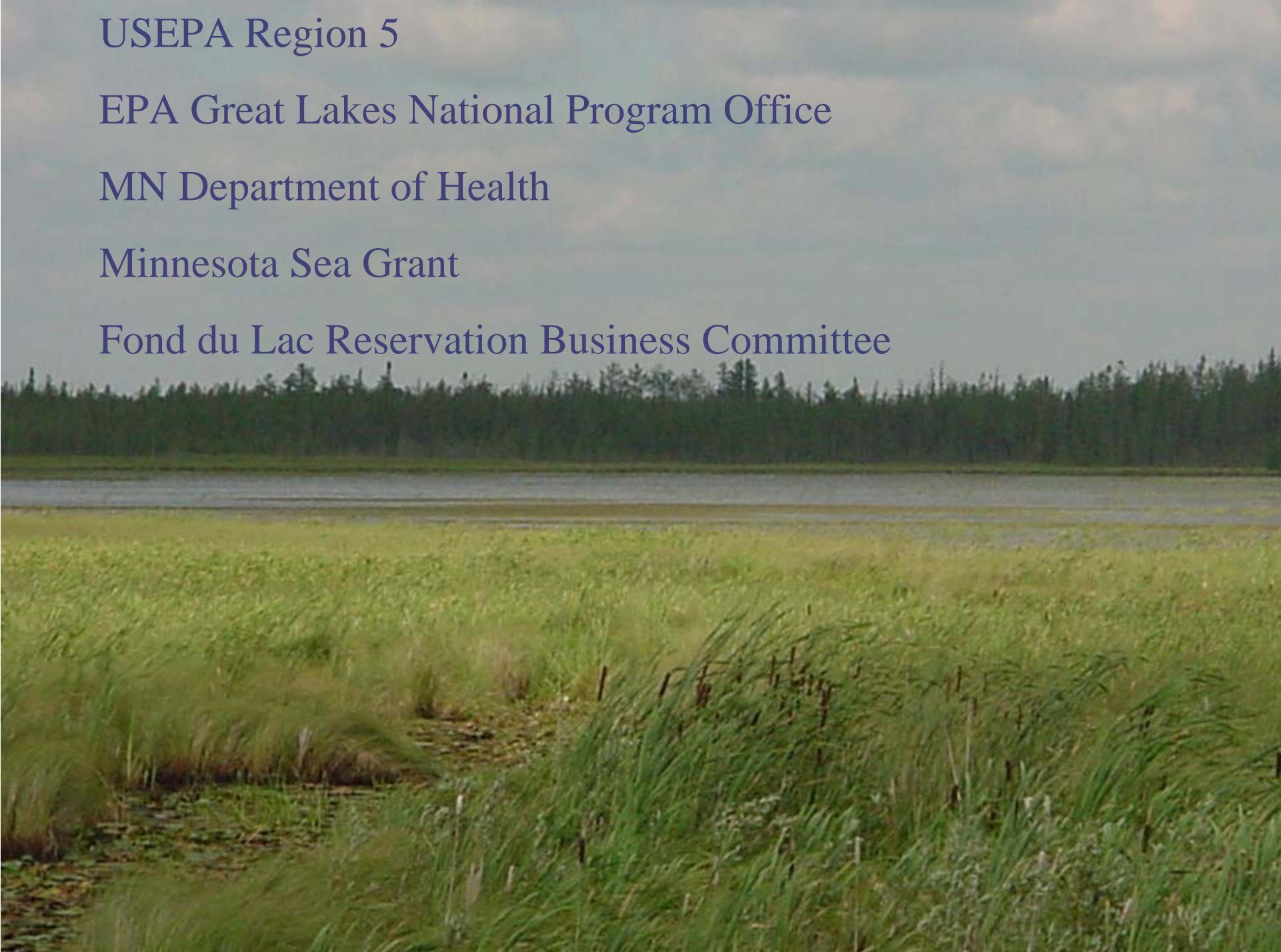
# Wild Foods Study

- Comprehensive risks/benefits analysis funded by MN Sea Grant
  - Cultural and nutritional benefits of wild foods (vs. market alternatives) offset contaminant exposure
  - Wild rice, waterfowl, moose analyzed for Hg, Pb
  - Waterfowl and fish have comparable Hg
- 



# Future Studies

- Sampling more waterfowl
  - Continuing fish tissue analysis
  - Continuing atmospheric deposition monitoring
  - Investigate potential sediment mercury mitigation techniques
- 



USEPA Region 5

EPA Great Lakes National Program Office

MN Department of Health

Minnesota Sea Grant

Fond du Lac Reservation Business Committee